

SEQUENCE LISTING

<110> THE JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE
 LEE, Se-Jin
 ESQUELA, Aurora F.

<120> METHODS OF DETECTING LIVER CELLS EXPRESSING GROWTH DIFFERENTIATION
 FACTOR-12

<130> JHU1220-4

<140> US 09/361,655

<141> 1999-07-27

<150> US 08/765,662

<151> 1997-04-28

<150> PCT/ US95/08745

<151> 1995-07-12

<150> US 08/274,215

<151> 1994-07-13

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<170> PatentIn version 3.1

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tgc agg cga gac cat tac gta gac ttc cag gaa ctg gga tgg cgg gac 96
 Cys Arg Arg Asp His Tyr Val Asp Phe Gln Glu Leu Gly Trp Arg Asp
 20 25 30

tgg ata ctg cag ccc gag ggg tac cag ctg aat tac tgc agt ggg cag 144
 Trp Ile Leu Gln Pro Glu Gly Tyr Gln Leu Asn Tyr Cys Ser Gly Gln
 35 40 45

tgc cct ccc cac ctg gct ggc agc cca ggc att gct gcc tct ttc cat 192
 Cys Pro Pro His Leu Ala Gly Ser Pro Gly Ile Ala Ala Ser Phe His
 50 55 60

tct gcc gtc ttc agc ctc ctc aaa gcc aac aat cct tgg cct gcc agt 240
 Ser Ala Val Phe Ser Leu Leu Lys Ala Asn Asn Pro Trp Pro Ala Ser
 65 70 75 80

acc tcc tgt tgt gtc cct act gcc cga agg ccc ctc tct ctc ctc tac 288
 Thr Ser Cys Cys Val Pro Thr Ala Arg Arg Pro Leu Ser Leu Leu Tyr
 85 90 95

ctg gat cat aat ggc aat gtg gtc aag acg gat gtg cca gat atg gtg 336

Leu Asp His Asn Gly Asn Val Val Lys Thr Asp Val Pro Asp Met Val
 100 105 110

gtg gag gcc tgt ggc tgc agc tag 360
 Val Glu Ala Cys Gly Cys Ser
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Cys Arg Arg Asp His Tyr Val Asp Phe Gln Glu Leu Gly Trp Arg Asp
 20 25 30

Trp Ile Leu Gln Pro Glu Gly Tyr Gln Leu Asn Tyr Cys Ser Gly Gln
 35 40 45

Cys Pro Pro His Leu Ala Gly Ser Pro Gly Ile Ala Ala Ser Phe His
 50 55 60

Ser Ala Val Phe Ser Leu Leu Lys Ala Asn Asn Pro Trp Pro Ala Ser
 65 70 75 80

Thr Ser Cys Cys Val Pro Thr Ala Arg Arg Pro Leu Ser Leu Leu Tyr
 85 90 95

Leu Asp His Asn Gly Asn Val Val Lys Thr Asp Val Pro Asp Met Val
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Val Glu Ala Cys Gly Cys Ser
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tgctgtcact gtgccctcat tggcccccag caatcagact caacagacgg agcaactgcc	180
atccgaggct cctgaaccag ggccattcac caggagc atg cgg ctc cct gat gtc	235
Met Arg Leu Pro Asp Val	
1 5	
cag ctc tgg ctg gtg ctg ctg tgg gca ctg gtg cga gca cag ggg aca	283
Gln Leu Trp Leu Val Leu Leu Trp Ala Leu Val Arg Ala Gln Gly Thr	
10 15 20	
ggg tct gtg tgt ccc tcc tgt ggg ggc tcc aaa ctg gca ccc caa gca	331
Gly Ser Val Cys Pro Ser Cys Gly Gly Ser Lys Leu Ala Pro Gln Ala	
25 30 35	
gaa cga gct ctg gtg ctg gag cta gcc aag cag caa atc ctg gat ggg	379
Glu Arg Ala Leu Val Leu Glu Leu Ala Lys Gln Gln Ile Leu Asp Gly	
40 45 50	
ttg cac ctg acc agt cgt ccc aga ata act cat cct cca ccc cag gca	427
Leu His Leu Thr Ser Arg Pro Arg Ile Thr His Pro Pro Pro Gln Ala	
55 60 65 70	
gcg ctg acc aga gcc ctc cgg aga cta cag cca ggg agt gtg gct cca	475
Ala Leu Thr Arg Ala Leu Arg Arg Leu Gln Pro Gly Ser Val Ala Pro	
75 80 85	
ggg aat ggg gag gag gtc atc agc ttt gct act gtc aca gac tcc act	523
Gly Asn Gly Glu Glu Val Ile Ser Phe Ala Thr Val Thr Asp Ser Thr	
90 95 100	
tca gcc tac agc tcc ctg ctc act ttt cac ctg tcc act cct cgg tcc	571
Ser Ala Tyr Ser Ser Leu Leu Thr Phe His Leu Ser Thr Pro Arg Ser	
105 110 115	
cac cac ctg tac cat gcc cgc ctg tgg ctg cac gtg ctc ccc acc ctt	619
His His Leu Tyr His Ala Arg Leu Trp Leu His Val Leu Pro Thr Leu	
120 125 130	
cct ggc act ctt tgc ttg agg atc ttc cga tgg gga cca agg agg agg	667
Pro Gly Thr Leu Cys Leu Arg Ile Phe Arg Trp Gly Pro Arg Arg Arg	
135 140 145 150	
cgc caa ggg tcc cgc act ctc ctg gct gag cac cac atc acc aac ctg	715
Arg Gln Gly Ser Arg Thr Leu Leu Ala Glu His His Ile Thr Asn Leu	
155 160 165	
ggc tgg cat acc tta act ctg ccc tct agt ggc ttg agg ggt gag aag	763
Gly Trp His Thr Leu Thr Leu Pro Ser Ser Gly Leu Arg Gly Glu Lys	
170 175 180	
tct ggt gtc ctg aaa ctg caa cta gac tgc aga ccc cta gaa ggc aac	811
Ser Gly Val Leu Lys Leu Gln Leu Asp Cys Arg Pro Leu Glu Gly Asn	
185 190 195	
agc aca gtt act gga caa ccg agg cgg ctc ttg gac aca gca gga cac	859
Ser Thr Val Thr Gly Gln Pro Arg Arg Leu Leu Asp Thr Ala Gly His	
200 205 210	
cag cag ccc ttc cta gag ctt aag atc cga gcc aat gag cct gga gca	907
Gln Gln Pro Phe Leu Glu Leu Lys Ile Arg Ala Asn Glu Pro Gly Ala	

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ggc cgg gcc agg agg agg acc ccc acc tgt gag cct gcg acc ccc tta				955
Gly Arg Ala Arg Arg Arg Thr Pro Thr Cys Glu Pro Ala Thr Pro Leu				
	235	240	245	
tgt tgc agg cga gac cat tac gta gac ttc cag gaa ctg gga tgg cgg				1003
Cys Cys Arg Arg Asp His Tyr Val Asp Phe Gln Glu Leu Gly Trp Arg				
	250	255	260	
gac tgg ata ctg cag ccc gag ggg tac cag ctg aat tac tgc agt ggg				1051
Asp Trp Ile Leu Gln Pro Glu Gly Tyr Gln Leu Asn Tyr Cys Ser Gly				
	265	270	275	
cag tgc cct ccc cac ctg gct ggc agc cca ggc att gct gcc tct ttc				1099
Gln Cys Pro Pro His Leu Ala Gly Ser Pro Gly Ile Ala Ala Ser Phe				
	280	285	290	
cat tct gcc gtc ttc agc ctc ctc aaa gcc aac aat cct tgg cct gcc				1147
His Ser Ala Val Phe Ser Leu Leu Lys Ala Asn Asn Pro Trp Pro Ala				
	295	300	305	310
agt acc tcc tgt tgt gtc cct act gcc cga agg ccc ctc tct ctc ctc				1195
Ser Thr Ser Cys Cys Val Pro Thr Ala Arg Arg Pro Leu Ser Leu Leu				
	315	320	325	
tac ctg gat cat aat ggc aat gtg gtc aag acg gat gtg eca gat atg				1243
Tyr Leu Asp His Asn Gly Asn Val Val Lys Thr Asp Val Pro Asp Met				
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gtg gtg gag gcc tgt ggc tgc agc tagcaagagg acctggggct ttggagtga				1297
Val Val Glu Ala Cys Gly Cys Ser				
	345	350		
gagaccaaga tgaagtttcc caggcacagg gcattctgtga ctggaggcat cagattcctg				1357
atccacaccc caaccaaca accacctggc aatatgactc acttgacccc tatgggaccc				1417
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Lys Leu Ala Pro Gln Ala Glu Arg Ala Leu Val Leu Glu Leu Ala Lys
 35 40 45

Gln Gln Ile Leu Asp Gly Leu His Leu Thr Ser Arg Pro Arg Ile Thr
 50 55 60

His Pro Pro Pro Gln Ala Ala Leu Thr Arg Ala Leu Arg Arg Leu Gln
 65 70 75 80

Pro Gly Ser Val Ala Pro Gly Asn Gly Glu Glu Val Ile Ser Phe Ala
 85 90 95

Thr Val Thr Asp Ser Thr Ser Ala Tyr Ser Ser Leu Leu Thr Phe His
 100 105 110

Leu Ser Thr Pro Arg Ser His His Leu Tyr His Ala Arg Leu Trp Leu
 115 120 125

His Val Leu Pro Thr Leu Pro Gly Thr Leu Cys Leu Arg Ile Phe Arg
 130 135 140

Trp Gly Pro Arg Arg Arg Arg Gln Gly Ser Arg Thr Leu Leu Ala Glu
 145 150 155 160

His His Ile Thr Asn Leu Gly Trp His Thr Leu Thr Leu Pro Ser Ser
 165 170 175

Gly Leu Arg Gly Glu Lys Ser Gly Val Leu Lys Leu Gln Leu Asp Cys
 180 185 190

Arg Pro Leu Glu Gly Asn Ser Thr Val Thr Gly Gln Pro Arg Arg Leu
 195 200 205

Leu Asp Thr Ala Gly His Gln Gln Pro Phe Leu Glu Leu Lys Ile Arg
 210 215 220

Ala Asn Glu Pro Gly Ala Gly Arg Ala Arg Arg Arg Thr Pro Thr Cys
 225 230 235 240

Glu Pro Ala Thr Pro Leu Cys Cys Arg Arg Asp His Tyr Val Asp Phe
 245 250 255

Gln Glu Leu Gly Trp Arg Asp Trp Ile Leu Gln Pro Glu Gly Tyr Gln
 260 265 270

Leu Asn Tyr Cys Ser Gly Gln Cys Pro Pro His Leu Ala Gly Ser Pro
 275 280 285

Gly Ile Ala Ala Ser Phe His Ser Ala Val Phe Ser Leu Leu Lys Ala
 290 295 300

Asn Asn Pro Trp Pro Ala Ser Thr Ser Cys Cys Val Pro Thr Ala Arg
 305 310 315 320

Arg Pro Leu Ser Leu Leu Tyr Leu Asp His Asn Gly Asn Val Val Lys
 325 330 335

Thr Asp Val Pro Asp Met Val Val Glu Ala Cys Gly Cys Ser
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